



# **U.S. Steel Corporation**

## **March 21, 2012**

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U.S. Steel's Vision - Making Steel. World Competitive. Building Value. - is supported by a series of core values within the company. One of those core values is environmental stewardship. We recognize that the earth is a shared and finite resource that we all must safeguard for generations to come. It is our commitment to sustainability that drives our operations to adopt management systems and best practices that foster continuous improvement in our processes; preserving vital resources and ensuring the future of the industry.

We do this because U.S. Steel is more than a global leader in the steel industry; we are your friends, neighbors and community partners. We breathe the same air, drink the same water and share the same hopes and dreams for our families.

As a company, U.S. Steel articulates its core value of environmental stewardship through four basic principles which are the responsibility of all of our operations and our employees. They are:



- Compliance with all environmental laws and regulations
- Continuous improvement in environmental and resource management
- Continued reduction of emissions
- Community partnerships to protect and preserve natural resources

Source: <http://www.uss.com/corp/environment/overview.asp>

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## Investigative Actions



- Gary Works, Great Lakes Works and Granite City Works
- Investigated 2006-2009
  - Inspections
  - Information requests
- NOV/FOVs issued
  - Gary: 6/25/08, 4/9/09 and 6/17/11
  - Great Lakes: 9/30/09 and 6/17/11
  - Granite City: 9/30/09

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## Gary Works - Gary, IN

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# Gary Works

## New Source Review

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## Regulatory Framework – NSR



- A project triggers NSR if:
  - Major source
  - Makes a modification
    - Physical change, or
    - Change in method of operation
  - Net emission increase is significant
    - 25 TPY PM; 15 TPY PM<sub>10</sub>; 40 TPY SO<sub>2</sub>
- NSR Permitting
  - BACT/LAER and modeling

## Gary Works - NSR



- 1990 Blast Furnace #4
- 2005 Blast Furnace #13/14

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## Blast Furnace #4



- Improved bosh cooling by increasing water velocities
- Increased cooling plate density in the lower stack, adding cooling plates in the stack region to increase heat removal
- Installed new graphite cooled carbon hearth to provide better cooling
- Rebricked the bosh with SiC refractory

## Blast Furnace #4



- Changes to furnace would have reduced downtime and increased production
- 17% increase in production after change
  - Obvious step increase
  - Little year to year variability before or after changes
- U.S. Steel's "Reline No. 4 Furnace" project summary
  - Increased rated capacity
  - Designed emissions increase exceeds "significant" threshold



## Blast Furnace #13/14



- Replaced furnace refractory lining with new and thinner refractory brick
- Replaced furnace shell
- Removed and replaced the top charging system with a new "bell-less" charging system
- Placed new copper staves in the mantle area of the furnace
- Installed new copper cooling places and a new bustle pipe
- Repaired the checker work brick in the stoves along with various structural, mechanical and electrical repairs
- Enlarged the slag granulator addition of a stack

## Blast Furnace #13/14



- The issued permit relied upon “could have accommodated” provision in NSR Reform
- NSR Reform provision was not approved into the SIP until July 2007
- U.S. Steel increased production; increased emissions exceeded “significant” threshold
- Even if “could have accommodated” provision applicable, US Steel’s methodology not substantiated
  - 4/20/10 “Northampton” letter

# Gary Works

Opacity

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## Gary Works Opacity



- 326 IAC 6.8-10-3, 326 IAC 5-1-2, NESHAP Subpart FFFFF – Fugitive Opacity
  - Slag Pit #8
  - Smoking bottle cars
  - QBOP Shop
  - Blast Furnaces #4 & 8 loading enclosure
  - Blast Furnaces #6, 8 & 14 casthouse monitor
  - BOP Shop roof monitor
  - BOP Shop north baghouse
  - Blast furnace #4 bell leaks
  - Blast furnace #6, 8 & 14 relief valve openings
  - Iron beaching
  - Coke processing equipment
  - Coke Battery #2 underfire stack
  - Coke Battery #5 underfire stack
  - Coke Battery #7 underfire stack

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## Gary Works Opacity (cont.)



- 326 IAC 6.8-9-3, NESHAP Subpart CCCCC – Coke Ovens
  - Coke Batteries #2, 5 & 7 pushing
  - Coke Batteries #5 & 7 door leaks
- 326 IAC 11-3-2 for Coke Ovens
  - Coke Battery #2 offtakes



# Gary Works

## Operations

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## Gary Works Operations



- **Blast Furnace #14**
  - Removal of suction from one tap hole when opening another
- **Blast furnace flares**
  - Failure to have pilot flame present
- **Blast furnace relief valve openings**
  - Failure to permit as emission source
- **Operation and Maintenance Plans - NESHAP**
  - Failure to set damper positions
  - Sinter plant operated without VOC monitoring system
- **Leak Detection and Repair**
  - Failure to make first attempt at repair within 5 days



# Granite City Works

Granite City, IL

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# Granite City Works

## New Source Review

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## Granite City Works - NSR



- 1994 Blast Furnace B
  - Redesign
    - Increased the hot blast to 2,000 ° F from 1,800 ° F
    - Reengineered/redesigned the cooling system
    - tripled cooling water flow
    - increased number of cooling water plates
  - These design changes reduced the need to suspend operation, thereby increasing the period of operation and increasing production and emissions
    - 12% increase in production after change



# Granite City Works

Opacity

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## Granite City Works - Opacity



- NESHAP Subpart FFFFF
  - Blast Furnace B casthouse monitor
  - BOP Shop roof monitor

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# Granite City Works

Operations

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## Granite City Works - Operations



- **NESHAP Subpart FFFFF and Title V**
  - **Operational violations**
    - Failure to meet fan amp limits and damper positions
    - Failed inspection, monitoring and recordkeeping
  - **Blast Furnace B bleeder openings**
    - Much higher than company average
  - **Failure to meet minimum requirements in Operation and Maintenance Plans**
- **Section 114 CAA**
  - **Failure to monitor beaching activity according to request**



## Great Lakes Works - Ecorse, MI

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# Great Lakes Works

Opacity

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## Great Lakes Works - Opacity



- R 336.1358, R 336.1201(3), NESHAP Subpart FFFFFF
  - Blast Furnace B2 casthouse monitor
  - BOF Shop roof monitor due to slag skimming
  - BOP Shop roof monitor
- R 324.5524(2)
  - Blast Furnaces B2 & D4 slag pits
  - Iron beaching
- R 336.1301
  - Blast Furnaces B2 & D4 relief valves

# Great Lakes Works

Operations

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## Great Lakes Works - Operations



- NESHAP Subpart FFFFF and Title V
  - Over 200 operational violations
    - Opacity exceedances
    - Failure to capture/control emissions
    - Failed inspection, monitoring and recordkeeping
  - Blast furnace bells - continuing operation during period of malfunction
  - Blast Furnace D4 bleeder openings
    - Much higher than Blast Furnace B2 and company average
  - Failure to meet minimum requirements in Operation and Maintenance Plans
- Title V
  - Operating during inspection without runner covers

# End of Violations



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# Manganese

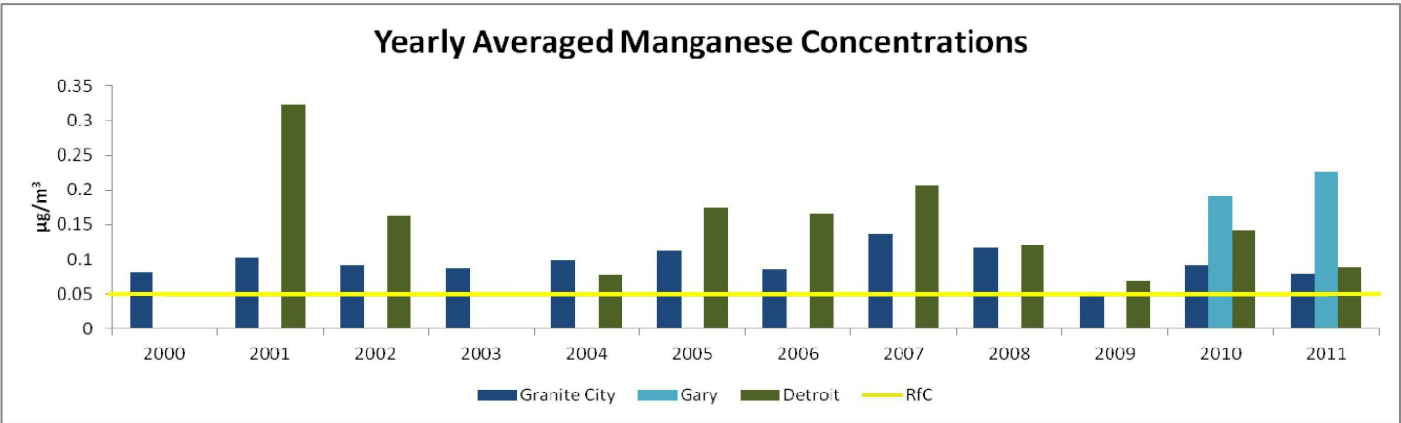


- **Manganese** is a HAP. The main health effect for exposed persons is impairment of neurological function.
- EPA's **Integrated Risk Information System (IRIS)** is a human health assessment program that evaluates risk information on effects that may result from exposure to environmental contaminants. Through IRIS, EPA provides the highest quality science-based human health assessments.
- The EPA-IRIS **Reference Concentration (RfC)** is an estimate of a continuous inhalation exposure that is likely to be without an appreciable risk of negative effects during a lifetime. The potential for health impacts increases with higher exposures.
- The RfC for Manganese: **0.05  $\mu\text{g}/\text{m}^3$**

# Manganese Concentrations

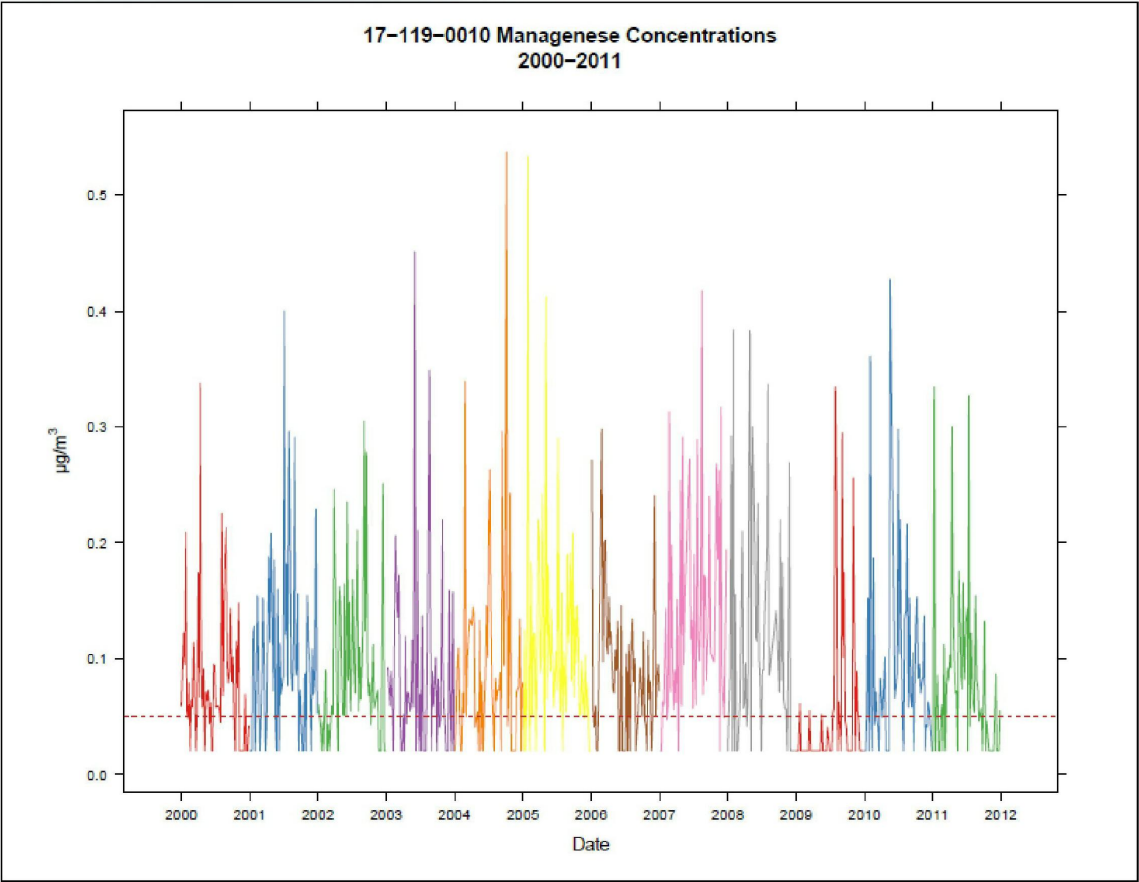


	Granite City	Gary	Detroit
Averages $\mu\text{g}/\text{m}^3$	2000-2011	2010-2011	2001-2011
	0.09	0.21	0.16
Percentage of RfC	189%	422%	314%



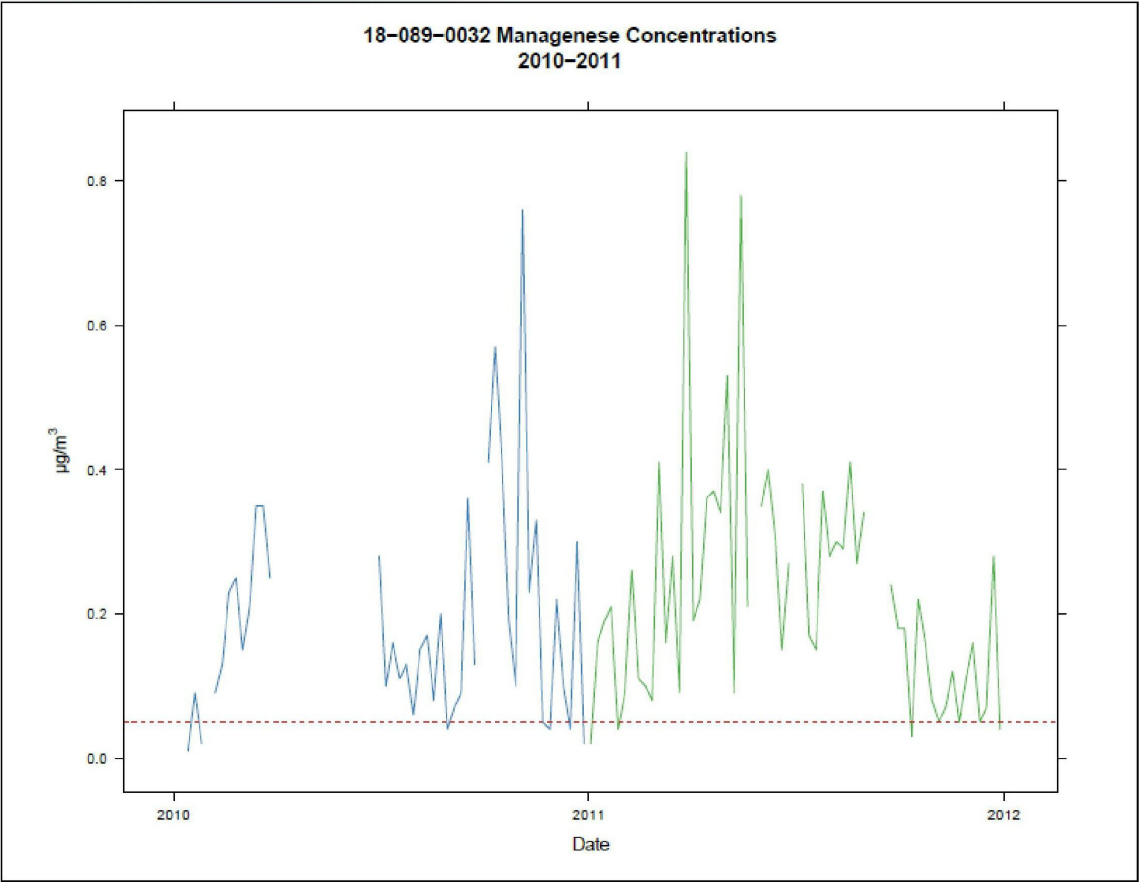


# Time Series Analysis Granite City

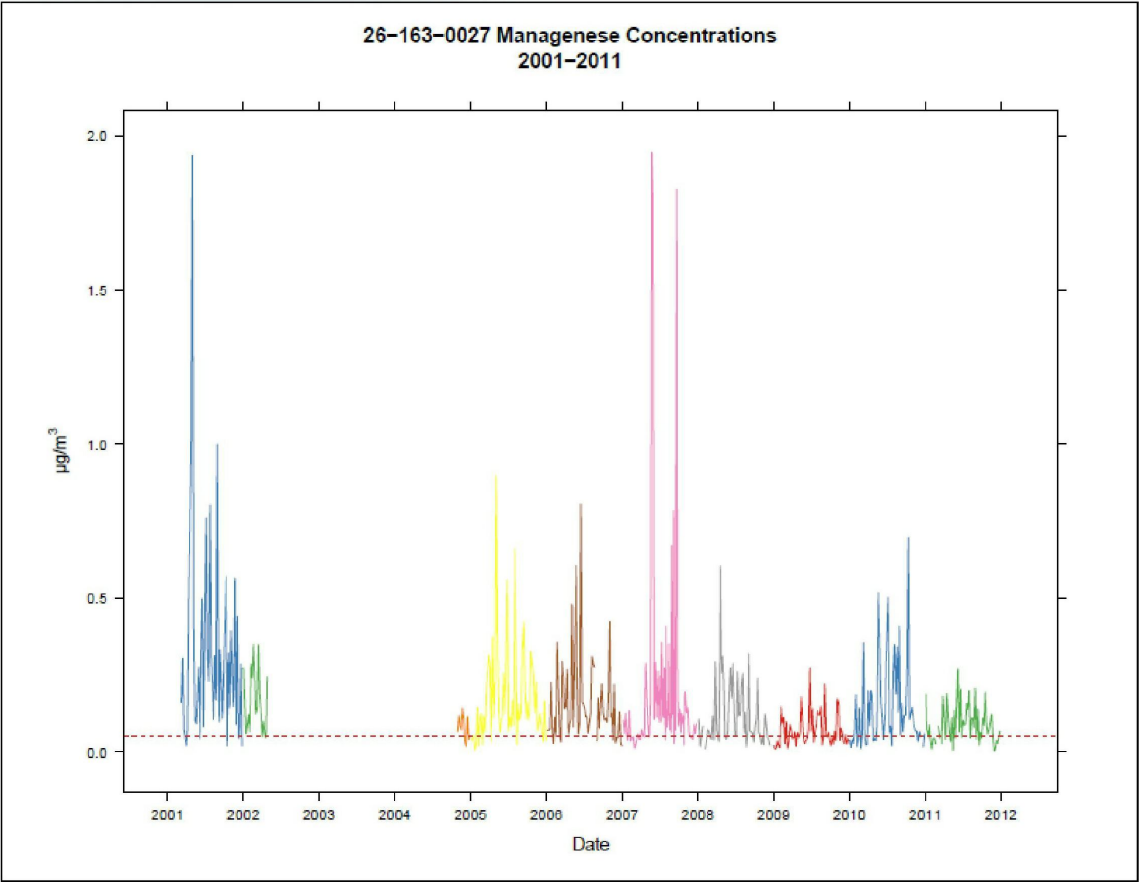


# Time Series Analysis

## Gary



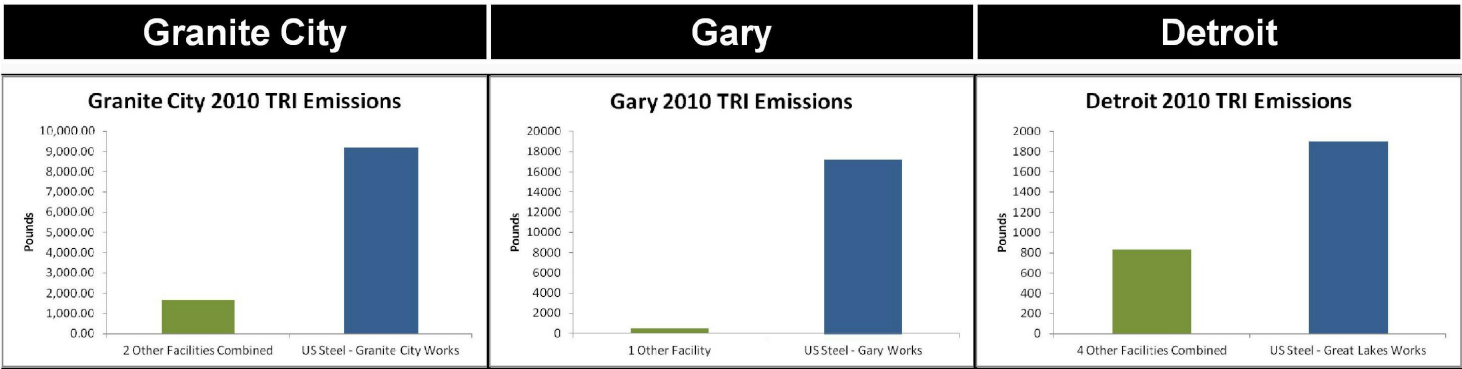
# Time Series Analysis Detroit



# Manganese Emissions Data

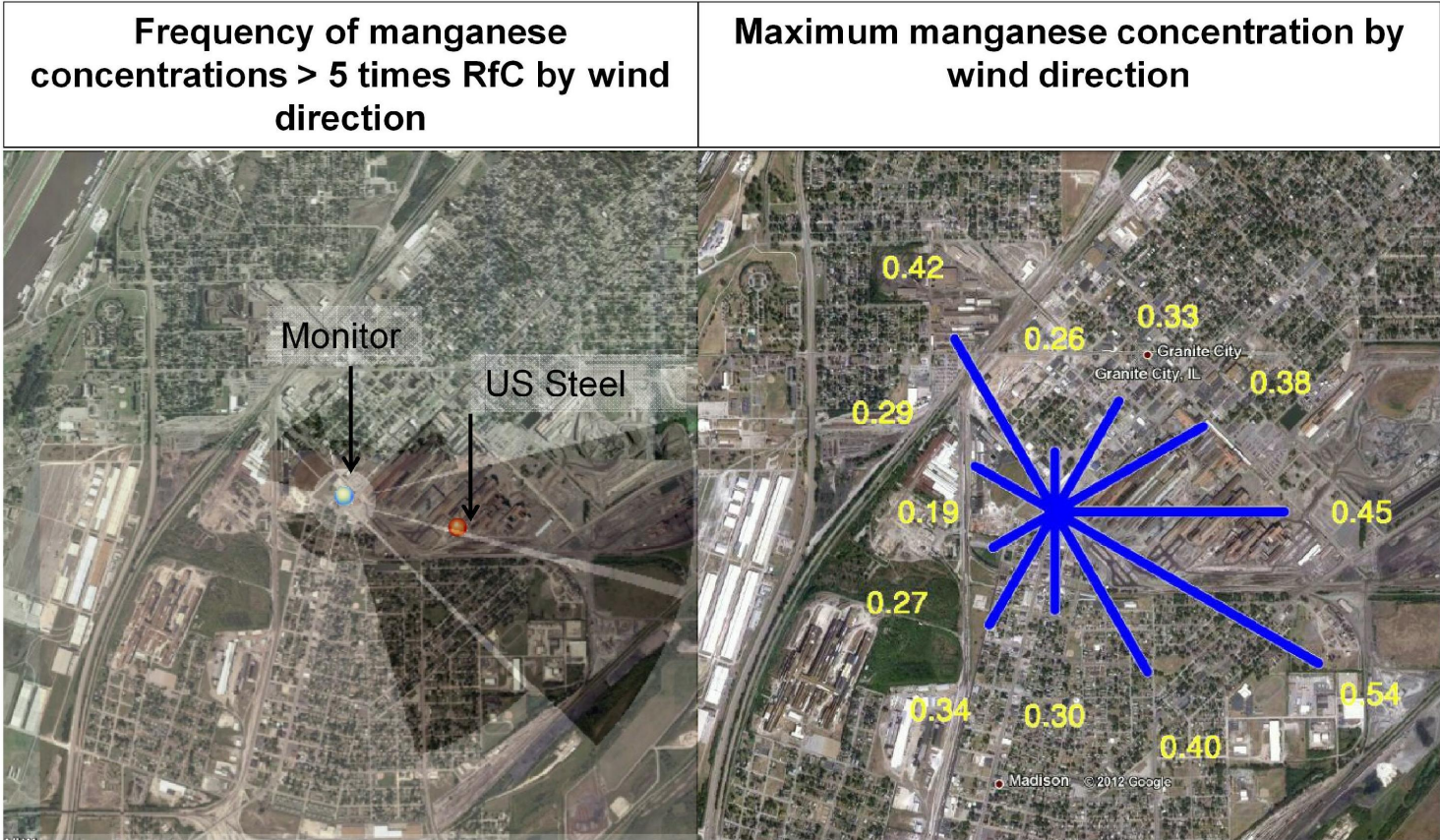


TRI (Toxics Release Inventory) data for all facilities reporting manganese air emissions within a 2 mile radius of the monitor recording elevated concentrations



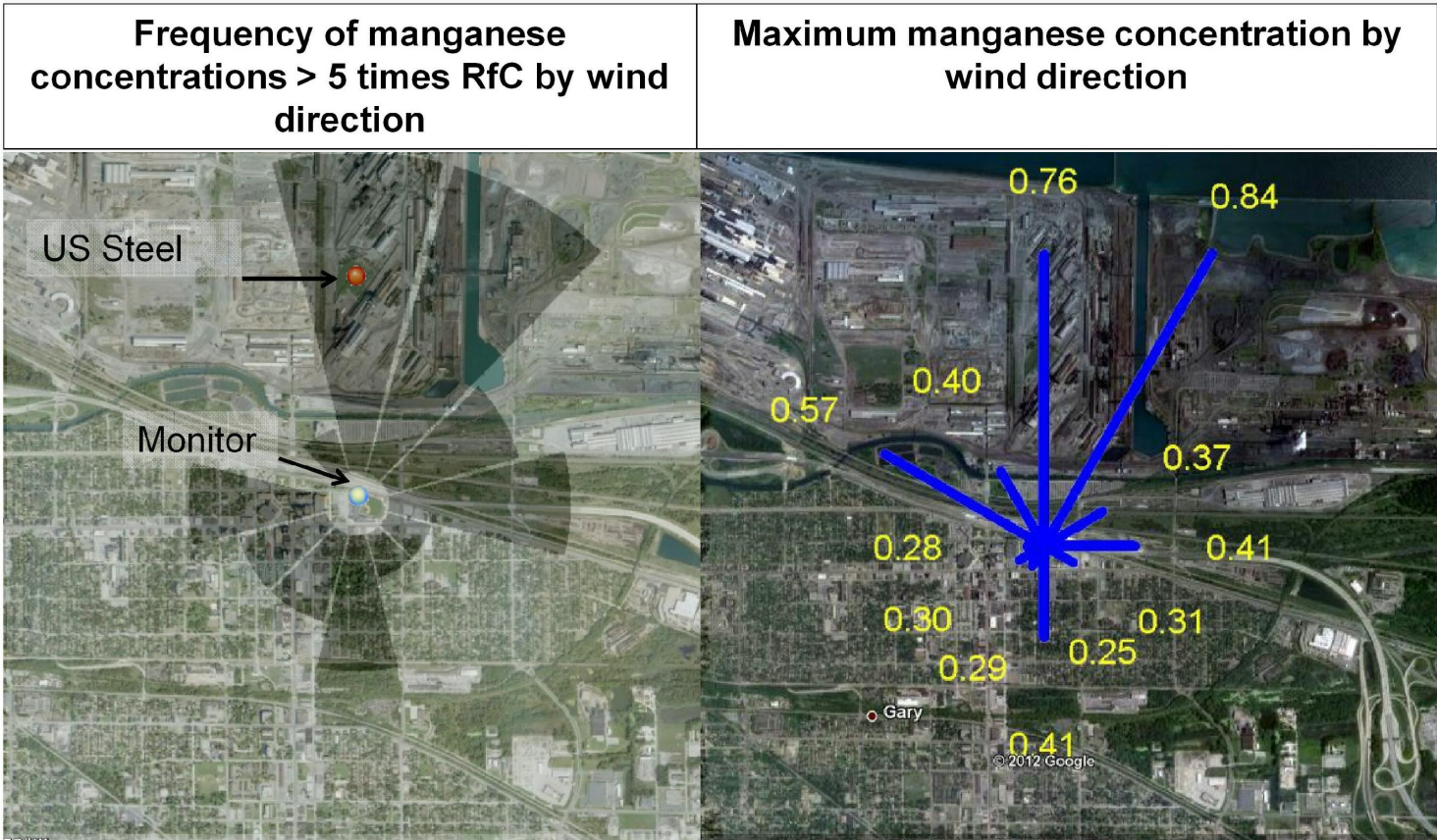


# Granite City Wind Directions for Elevated Manganese

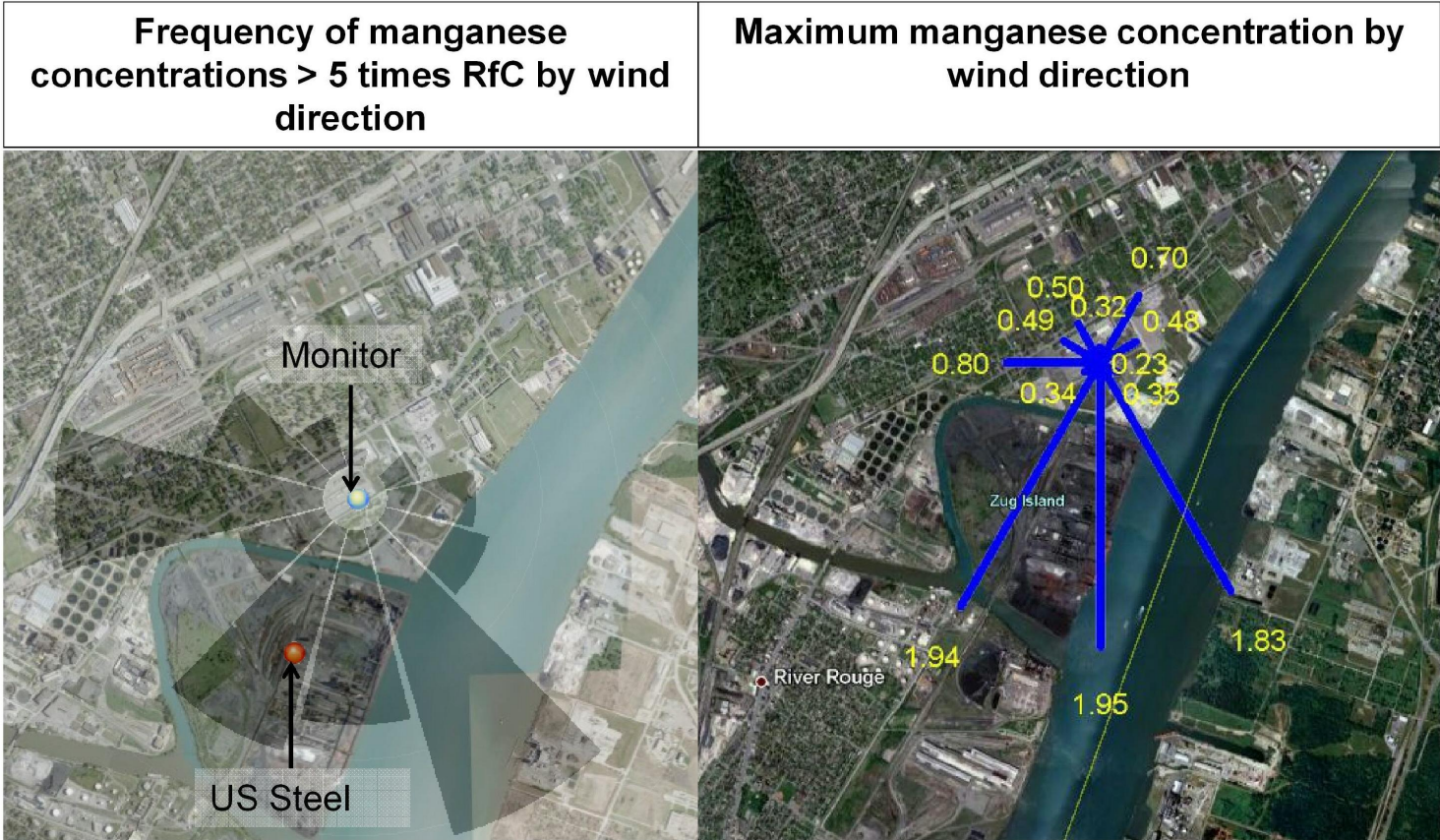




# Gary Wind Directions for Elevated Manganese



# Detroit Wind Directions for Elevated Manganese





# Remedies



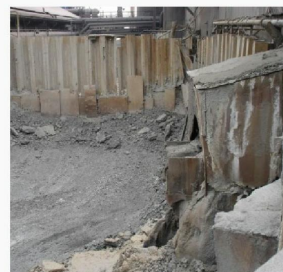
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## Region-Wide Concerns



- Blast furnace relief valve openings
- Blast furnace bell leaks
- Casthouse SO<sub>2</sub> emissions
- Iron beaching
- Slag pits
  - Opacity from dressing
  - Opacity from first tap into new row
  - SO<sub>2</sub> emissions



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## Operational Violations



- All mills
- Violations not listed individually in this presentation
- However, remedy expected, e.g.
  - Modify SOPs
  - Update monitoring/sampling plans
  - Train operators
  - Comply with Fugitive Emissions Plan, including roadway spraying
  - Etc.

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# Remedies

## Gary Works

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## Gary Works – New Equipment



- Blast Furnaces #4, #6 & #8  
casthouse active controls
  - Hoods at trough, dam and iron spout
  - Fans
  - Common baghouse
  - Dry sorbent injection to capture SO<sub>2</sub> on common fume capture system, or provide alternative means of SO<sub>2</sub> reduction

## Gary Works – New Equipment



- **Blast Furnaces #4, #6 & #8 slag pits**
  - Install partial cover or large hood over slag spout area, directing emissions to a common wet scrubber, or provide alternative means of SO<sub>2</sub> reduction
  - Equipment and procedures to minimize dust, including during slag removal
- **Blast Furnace #14**
  - Increase airflow through existing control system to retain capture at two holes
  - Dry sorbent injection to capture SO<sub>2</sub> on common fume capture system, or provide alternative means of SO<sub>2</sub> reduction

## Gary Works – New Equipment



- **#5, #7 Coke ovens and quench towers, either:**
  - Commit to shutdown ovens/towers
  - Structure settlement to require improvements commensurate with operation/shutdown decisions
    - The decision to operate long term triggers substantial investment e.g. #7 pushing baghouse, #5 & 7 doors
- **#2 Coke oven**
  - 3<sup>rd</sup> party evaluation of pusher scrubber car
  - Submit offtake piping replacement plan



## Gary Works – Work Practices: Permit Conditions



- Bell leaks – repair as soon as detected
  - Repairs to commence within 48 hours once any single opacity reading exceeds 10%
- Blast furnace slips - identify ways and write SOP designed to limit slips from Blast Furnaces #4, 6 & 8
  - Limit on number of slips per month
- Blast furnace relief valves – identify improvements to limit relief valve open time and prevent opacity during planned openings
  - 10% opacity limit, 3-min average (for planned openings)

## Gary Works – Work Practices



- BOF Shop - identify operational and equipment improvements to reduce roof monitor emissions
  - Submit 'Evaluation, Findings, and Recommendations' from independent consultant to EPA
- Bottle cars - Kaewool covers over car openings
- QBOP Shop - identify ways to improve QBOP slag skimming dust capture; close openings in QBOP shop so opacity exits the shop at the roof monitor
  - Submit 'Evaluation, Findings, and Recommendations' from internal evaluation to EPA
- Beaching – develop and submit beaching procedures and evaluate their effect on opacity outside of the partial enclosure

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## Gary Works – Work Practices (cont.)



- LMF - identify operational and equipment improvements to reduce roof monitor emissions
  - Review Includes:
    - Control device working and dampers open at all times
    - Minimize gap around electrodes
    - Economic feasibility of Dry Sorbent Injection prior to baghouse



# Remedies

## Granite City Works

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## Granite City – New Equipment



- **Blast Furnace B casthouse**
  - Capture particulate from entire length of trough and from dam; extend trough hood over dam or install new hood over dam
    - Increase airflow to accommodate additional capture
  - Dry sorbent injection to capture SO<sub>2</sub> on fume capture system, or provide alternative means of SO<sub>2</sub> reduction
- **Blast Furnace B slag pits**
  - Install partial cover or large hood over slag spout area, directing emissions to a wet scrubber, or provide alternative means of SO<sub>2</sub> reduction
  - Equipment and procedures to minimize dust, including during slag removal

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## Granite City – Work Practices: Permit Conditions



- Bell leaks – repair as soon as detected
  - Repairs to commence within 48 hours once any single opacity reading exceeds 10%
- Blast furnace slips - identify ways and write SOP designed to limit slips from blast furnaces
  - Limit on number of slips per month
- Blast Furnace relief valves – identify improvements to limit relief valve open time and prevent opacity during planned openings
  - 10% opacity limit, 3-min average (for planned openings)

## Granite City – Work Practices (cont.)




- Blast Furnace casthouse maintenance
  - Modify SOP to define “active work” and limit length of time before and after work that covers can be off
  - Internal review of improvement opportunities



## Granite City – Work Practices (cont.)



- LMF - identify operational and equipment improvements to reduce roof monitor emissions
  - Review Includes:
    - Control device working and dampers open at all times
    - Minimize gap around electrodes
    - Feasibility of Dry Sorbent Injection prior to baghouse



# Remedies

## Great Lakes Works

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## Great Lakes – New Equipment



- Blast Furnace Slag Pits
  - Install partial cover or large hood over Blast Furnaces B2 and D4 slag spout area, directing emissions to a wet scrubber, or provide alternative means of PM reduction
- Equipment and procedures to minimize dust, including during slag removal

## Great Lakes – Work Practices: Permit Conditions



- Bell leaks – repair as soon as detected
  - Repairs to commence within 48 hours once any single opacity reading exceeds 10%
- Blast furnace slips - identify ways and write SOP designed to limit slips from blast furnaces
  - Limit on number of slips per month
- Blast furnace relief valves – identify improvements to limit relief valve open time and prevent opacity during planned openings
  - 10% opacity limit, 3-min average (for planned openings)

## Great Lakes – Work Practices (cont.)



- **Blast furnace casthouse maintenance**
  - Modify SOP to define “active work” and limit length of time before and after work that covers can be off
  - Maintain spare runner covers
  - Internal review of improvement opportunities
- **BOP Shop roof monitor**
  - Increase Method 9 VE readings to confirm adequacy of new controls
  - Internal review of improvement opportunities at slag skimming

## Great Lakes Remedy – Work Practices (cont.)



- Perform holistic review of Title V inspection, monitoring and recording procedures; utilize computer tracking similar to Gary Works
- Beaching – perform in BOF Shop with SOP designed for minimizing emissions

## Great Lakes Works – Work Practices (cont.)




- LMF - identify operational and equipment improvements to reduce roof monitor emissions
  - Review Includes:
    - Control device working and dampers open at all times
    - Minimize gap around electrodes
    - Feasibility of Dry Sorbent Injection prior to baghouse



## Environmental Justice



- U.S. has EJ obligations
  - Community Involvement
- Expect community focus on manganese
  - Remedy proposed here will reduce emissions, however additional remedy may be warranted
  - Future discussion needed



# Proposed Resolution Process

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## Settlement Approach



- Multi-facility settlement
- Expedited negotiations
- Settlement document

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## Elements of Consent Decree



- Injunctive relief
- Penalty
- Permitting
- Reporting requirements
- Stipulated Penalties
- Other appropriate standard provisions

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## Next Steps



- US Steel to decide whether to participate in the settlement process
- US Steel to respond to governments' proposal
- Set a date for next meeting or conference call



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